

REMARKS

This is in response to the office action mailed on February 27, 2006, in which claims 1-3, 5-9, and 11-13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Song et al. (U.S. Pat. No. 6,121,677), claims 4, 10, and 22 were rejected under 35 U.S.C. 103(a) as being unpatentable over Song et al. as applied to claims 7-9 above, and further in view of Lee (U.S. Pat. No. 4,935,645), and claim 14 was rejected under 35 U.S.C. 103(a) as being unpatentable over Song as applied to claim 12 above, and further in view of Fenner et al. (U.S. Pat. No. 6,627,917).

Examiner Interview

The Applicant would like to thank Examiner Alonzo Chambliss for his time in discussing the merits of this application with David Fairbairn and Michael Collins on April 18, 2006. Proposed amendments to independent claims 1, 7, 12 and 22 were discussed with respect to the prior art cited in the February 27, 2006 office action.

With respect to independent claim 1, the Applicant suggested amending the claim to clarify that the fuse circuits are “*device trimming* fuse circuits” (italicized text indicating proposed amendment). Furthermore, the Applicant suggested amending claim 1 to recite “a first conductor extending from the device trimming fuse circuit to the first pad *to provide a current path by which* the integrated circuit die is *electrically* trimmed by selectively applying a signal from the first pad to the device trimming fuse circuit through the first conductor.” (italicized text indicating a proposed amendment). These amendments clarify differences between the present application and the Song reference. In particular, the amendments make clear that the fuse circuits are “device trimming fuse circuits” and that the integrated circuit die is “*electrically* trimmed.”

Similar amendments were made with respect to independent claims 7, 12, and 22, clarifying the differences between the isolation devices taught by Song and the device trimming fuse circuits used for electrical trimming of integrated circuits as taught by the present invention.

The Examiner agreed to enter the Applicant’s amendments, but no formal agreement was reached as to whether the proposed amendments would put the application into condition for allowance.

Claim Rejections – 35 U.S.C. § 103

Claims 1-3, 5-9, and 11-13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Song et. al. (U.S. Pat. No. 6,121,677) (“Song”), claims 4, 10, and 22 were rejected under 35 U.S.C. 103(a) as being unpatentable over Song as applied to claims 7-9 above, and further in view of Lee (U.S. Pat. No. 4,935,645) (“Lee”), and claim 14 was rejected under 35 U.S.C. 103(a) as being unpatentable over Song as applied to claim 12 above, and further in view of Fenner et. al. (U.S. Pat. No. 6,627,917) (“Fenner”).

The Applicant would like to reiterate the definition of the term “trimming.” As defined in the specification, trimming is a process used “to bring the electrical characteristics within permitted parameters. For example, trimming can be used to adjust resistances or capacitances, to adjust transconductance values, and to correct for DC offsets produced by process variations.” (Paragraph 0003). Electrical trimming of an integrated circuit is accomplished by selectively applying a signal to fuse circuits (i.e., blowing selected fuses). (See Paragraph 0004). This is in contrast with “wafer dicing” or “singularization” in which integrated circuit dices located on a wafer are physically separated from one another (typically using a saw). In between the functional parts of the integrated circuit dices are scribe lanes that “separate integrated circuits 12 from one another, and provide an area in which scribing occurs to separate the individual integrated circuit die 12 from wafer 10.” (Paragraph 0011).

The present invention provides significant savings in integrated circuit die area by positioning the device trimming fuse circuits adjacent to the scribe lane between integrated circuits and locating pads within the scribe lane. Conductors extend from the device trimming fuse circuits within the integrated circuit into the scribe lane to connect the pads to the device trimming fuse circuits. Prior to wafer dicing (i.e., singularization), the electrical characteristics of the integrated circuits are trimmed by selectively applying a signal from the pads to the device trimming fuse circuits. When the integrated circuits are severed from the wafer (during wafer dicing), the pads located within the scribe lane are severed from the integrated circuits.

Independent Claim 1

Independent claim 1 has been amended to clarify differences between independent claim 1 and the Song reference. Amended independent claim 1 now recites “an integrated circuit die having a *device trimming fuse circuit* . . . and a first conductor extending from the device trimming fuse circuit to the first pad to provide a current path by which the integrated circuit die is *electrically trimmed* by selectively applying a signal from the first pad to the device trimming fuse circuit through the first conductor.” With this amendment, independent claim 1 recites claim elements (i.e., device trimming fuse circuit) previously examined with respect to independent claims 7 and 22. Therefore, this amendment does not constitute the addition of new matter.

In contrast, Song teaches the use of isolation devices 24 (i.e., fuses) for a purpose unrelated to integrated circuit device trimming. Song states, “The isolation devices 24 may be used to isolate the conductive lines 22 from one another to avoid the conductive lines 22 from shorting together when the scribe regions 100 are removed. For example, the isolation devices 24 may isolate conductive lines 22 from one another so that if cutting of the scribe region 100 causes a short between conductive lines 22, the test circuits are unaffected by the short.” (Col. 4, lines 1-8). Therefore, the isolation devices 24 in Song are used to electrically isolate conductive lines 22, which otherwise could be shorted together when the scribe region is cut. The isolation device 24 described in Song are not device trimming fuse circuits and can not be used to trim the electrical characteristics of an integrated circuit die as required by independent claim 1.

Furthermore, Song states that “isolation devices 24 may be fuses that are severed to disconnect test pads 20 from the test circuits in the integrated circuit regions 400.” (Col. 3, ll. 64-68). Song does not recite that test pads 20 are responsible for supplying a signal that severs the isolation devices. Therefore, Song does not teach electrically trimming the integrated circuit die by “selectively applying a signal from the first pad to the device trimming fuse circuit through the first conductor.” Therefore, Song does not teach each and every element of independent claim 1.

With respect to the Office Action’s characterization of independent claim 1 as a “product-by-process” claim, the Applicant respectfully disagrees. Independent claim 1 is an apparatus claim directed toward an “integrated circuit wafer” as recited in the preamble. The integrated circuit wafer described by independent claim 1 is comprised of “an integrated circuit die

having a device trimming fuse circuit; a first pad . . . and a first conductor . . .” Furthermore, independent claim 1 has been amended to recite “*a first conductor extending from the device trimming fuse circuit to the first pad to provide a current path by which the integrated circuit die is electrically trimmed by selectively applying a signal from the first pad to the fuse circuit through the fuse conductor.*” This amendment clarifies that the conductor is the structure that provides a current path by which the integrated circuit is electrically trimmed. Thus, this claim term is not a process or step required to make the integrated circuit wafer. Rather, the integrated circuit wafer is manufactured with the capability of trimming the electrical characteristics of the individual circuit die located on the integrated circuit wafer “by selectively applying a signal from the first pad to the fuse circuit through the fuse conductor.” Therefore, the characterization of independent claim 1 as a product-by-process claim should be withdrawn.

In the alternative, even if independent claim 1 were interpreted as a product-by-process claim, the product described by Song is fundamentally different than the product described by independent claim 1. The Song reference employs isolation devices 24 (e.g., fuses) to isolate the conductive lines 22 from one another to avoid the conductive lines 22 from shorting together when the scribe regions 100 are removed.” (Col 4, ll. 1-4). Therefore, Song teaches an integrated circuit wafer in which conductive lines 22 are electrically isolated from one another, but does not teach an integrated circuit wafer that includes integrated circuit dice that can be trimmed to bring the electrical characteristics of the integrated circuit dice within permitted parameters. Therefore, even if independent claim 1 were interpreted as a product by process claim, the product defined by Song is not a trimmed integrated circuit as required by independent claim 1.

Therefore, the Applicant respectfully requests that amended independent claim 1 is in condition for allowance.

Dependent claims 2-6

Claims 2-3 and 5-6 were rejected under 35 U.S.C. 103(a) as being unpatentable over Song, and claim 4 was rejected under 35 U.S.C. 103(a) as being unpatentable over Song in view of Lee (U.S. Pat. No. 4,935,645). Claim 5 has been amended to correctly depend from claim 4. Claims 2-6 depend from amended independent claim 1. As such, these claims are allowable with their

independent base claim. In addition, the combinations of features recited in claims 2-6 are patentable on their own merits, although this does not need to be specifically addressed herein since any claim depending from a patentable independent claim is also patentable. See M.P.E.P. 2143.03, citing In re Fine, 5 U.S.P.Q.2d (BNA) 1596 (Fed. Cir. 1988).

Independent Claim 7

Claim 7 was rejected under 35 U.S.C. 103(a) as being unpatentable over Song. For reasons discussed above with respect to independent claim 1, Song does not teach “a plurality of integrated circuit dice . . . having *device trimming fuse circuits* adjacent the scribe lanes.” Independent claim 7 has also been amended to clarify that the device trimming fuse circuits are used “*to electrically trim electrical circuitry of the integrated circuit die.*” As discussed above with respect to independent claim 1, the isolation devices taught by the Song reference are not used to electrically trim the integrated circuit dices.

Furthermore, for the reasons discussed with respect to independent claim 1, amended independent claim 7 should not be interpreted as a product-by-process claim. In particular, amended independent claim 7 recites “a plurality of pads positioned in the scribe lane and connected to the device trimming fuse circuits by conductors for selectively applying a fuse blowing signal to the device trimming fuse circuits to electrically trim electrical circuitry of the integrated circuit die.” The claim term identified by the Office Action as making independent claim 7 a product-by-process claim (underlined portion) is not a process step. Rather, the underlined claim term describes the purpose and function of the *conductors*, which are employed for selectively applying a fuse blowing signal to the device trimming fuse circuits. Therefore, independent claim 7 should not be interpreted as a product-by-process claim. Furthermore, for the reasons discussed with respect to independent claim 1, even if independent claim 7 were interpreted as a product-by-process claim, the integrated circuit wafer described by independent claim 7 includes trimmed integrated circuit dies that are not described or taught by Song.

Therefore, the Applicant respectfully requests that amended independent claim 7 is in condition for allowance.

Dependent Claims 8-11

Claims 8-9 and 11 were rejected under 35 U.S.C. 103(a) as being unpatentable over Song, and claim 10 was rejected under 35 U.S.C. 103(a) as being unpatentable over Song in view of Lee. Claims 8-11 depend from amended independent claim 7. As such, these claims are allowable with their independent base claim. In addition, the combinations of features recited in claims 8-11 are patentable on their own merits, although this does not need to be specifically addressed herein since any claim depending from a patentable independent claim is also patentable. See M.P.E.P. 2143.03, citing In re Fine, 5 U.S.P.Q.2d (BNA) 1596 (Fed. Cir. 1988).

Independent Claim 12

Independent claim 12 has been amended clarify differences between independent claim 12 and the Song reference. Amended independent claim 12 now recites “a plurality of *device trimming fuses* positioned adjacent a die edge of the integrated circuit . . . and a plurality of conductors extending across the die edge for connecting the pads and the device trimming fuses to allow *electrical trimming* of the integrated circuit by selective blowing of the device trimming fuses”

With this amendment, independent claim 12 recites claim elements previously examined with respect to independent claims 7 and 22. Therefore, this amendment does not constitute the addition of new matter.

For the reasons discussed above with respect to independent claims 1 and 7, Song does not teach “device trimming fuses” and does not teach “electrical trimming” of the integrated circuit by selective blowing of the device trimming fuses. Therefore, Song does not teach each and every element of independent claim 12.

Furthermore, for the reasons discussed with respect to independent claims 1 and 7, independent claim 12 should not be interpreted as a product-by-process claim. In particular, independent claim 12 recites “a trimmable integrated circuit comprising . . . a plurality of conductors extending across the die edge for connecting the pads and the fuses to allow electrical trimming of the integrated circuit by selective blowing of the fuses.” This claim term does not describe a process or method of manufacturing a trimmable integrated circuit. Instead, the underlined claim term in independent claim 12 recites the function performed by the conductors that extend across the die

edge and connect the pads and the fuses (as well as further explaining the function of the device trimming fuses).

As discussed above, even assuming that independent claim 12 were interpreted as a product-by-process claim, the product described by independent claim 12 is different than the product defined by Song. Independent claim 12 recites a trimmable integrated circuit. In contrast, the integrated circuit taught by Song is not a trimmable integrated circuit.

Therefore, the Applicant respectfully requests that amended independent claim 12 is in condition for allowance.

Dependent claims 13 and 14

Claims 13 was rejected under 35 U.S.C. 103(a) as being unpatentable over Song, and claim 14 was rejected under 35 U.S.C. 103(a) as being unpatentable over Song in view of Fenner et. al. (U.S. Pat. No. 6,627,917). Claims 13-14 depend from amended independent claim 12. As such, these claims are allowable with their independent base claim. In addition, the combinations of features recited in claims 13-14 are patentable on their own merits, although this does not need to be specifically addressed herein since any claim depending from a patentable independent claim is also patentable. See M.P.E.P. 2143.03, citing In re Fine, 5 U.S.P.Q.2d (BNA) 1596 (Fed. Cir. 1988).

Independent claim 22

Independent claim 22 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Song as applied to claims 7-9 in further view of Lee. Independent claim 22 has been amended to recite “an integrated circuit die having a plurality of device trimming fuse circuits adjacent a die edge and conductors extending from the fuse circuits to the die edge, the conductors providing connection between the fuse circuits and pads which are severed from the die subsequent to electrical trimming of the integrated circuit die by selectively blowing fuses of the fuse circuit.” For the reasons discussed above with respect to independent claim 1, neither Song nor Lee teach device trimming fuse circuits or the electrical trimming of an integrated circuit die by selectively blowing fuses of the fuse circuit as recited by amended independent claim 22.

Furthermore, in rejecting independent claim 22, the Office Action states that “Song discloses the claimed invention [described in independent claim 22] except for explicitly disclosing a fuse circuit including a fuse and circuitry for sensing whether the fuse is blown. However, Lee discloses a fuse circuit including a fuse and circuitry for sensing whether the fuse is blown as evident by Lee.” The Applicant would like to note that independent claim 22 does not require circuitry for sensing whether the fuse is blown. However, because neither Song nor Lee teach device trimming fuse circuits as required by independent claim 22, the Applicant respectfully requests that independent claim 22 is in condition for allowance.

CONCLUSION

Claims 1-14 and 22 are in condition for allowance. Notice to that effect is requested.

Respectfully submitted,

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